

299-E17-01 (A4728) Log Data Report

Borehole Information:

Borehole: 299-E17-01 (A4728)		Site: 216-A-10 Crib			
Coordinates (WA State Plane)		GWL (ft)¹: 321.6	GWL Date: 3/31/2003		
North	East	Drill Date	TOC² Elevation	Total Depth (ft)	Type
135,386.153 m	574,977.079 m	Dec. 1955	220.311 m	324	Cable Tool

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Welded steel	1.8	8 5/8	8	5/16	0	334.8
Welded steel	2.4	6 5/8	6	5/16	0	280
The logging engineer measured the casing stick up using a steel tape. A caliper was used to determine the outside casing diameters. The caliper and inside casing diameter were measured using a steel tape. Measurements were rounded to the nearest 1/16 in. Casing thicknesses were calculated. The inside diameter of the 8-in. casing was estimated.						

Borehole Notes:

Borehole coordinates, elevation, and well construction information are from measurements by Stoller field personnel, HWIS³, and Ledgerwood (1993). Duratek well services removed the groundwater pump and tubing before logging began. A packer is set at the bottom of the 6-in. casing. The 8-in. casing is perforated from 0 to 275 ft and from 303 to 333 ft (Ledgerwood 1993). The annulus between the 6-in. and 8-in. casings was grouted with cement to 280 ft (Ledgerwood 1993). Zero reference is the top of the 6-in. casing. There is no reference point survey "X" at the top of the casing stick up. The casing stick ups were measured from the top of the concrete pad. A 2-ft-diameter by 0.5-ft-thick concrete pad is located at the surface.

Logging Equipment Information:

Logging System:	Gamma 2E	Type:	70% HPGe
Calibration Date:	03/2003	Calibration Reference:	GJO-2003-430-TAC
		Logging Procedure:	MAC-HGLP 1.6.5, Rev. 0

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	1	2	3	4/Repeat	
Date	3/31/03	4/01/03	4/01/03	4/01/03	
Logging Engineer	Pearson	Pearson	Pearson	Pearson	
Start Depth (ft)	3.0	329.0	281.0	90.0	
Finish Depth (ft)	200.0	280.0	199.0	57.0	
Count Time (sec)	100	50	100	100	
Live/Real	R	R	R	R	

Log Run	1	2	3	4/Repeat	
Shield (Y/N)	N	N	N	N	
MSA Interval (ft)	1.0	1.0	1.0	1.0	
ft/min	N/A ⁴	N/A	N/A	N/A	
Pre-Verification	BE009CAB	BE010CAB	BE010CAB	BE010CAB	
Start File	BE009000	BE010000	BE010050	BE010133	
Finish File	BE009197	BE010049	BE010132	BE010166	
Post-Verification	BE009CAA	BE011CAA	BE011CAA	BE011CAA	
Depth Return Error (in.)	0.25 low	N/A	N/A	2.0 high	
Comments	Fine-gain adjustment after file BE009109.	No fine-gain adjustments.	No fine-gain adjustments.	No fine-gain adjustments.	

Logging Operation Notes:

Zero reference was top of the 6-in. casing. Logging was performed with the centralizer installed on the sonde. Pre- and post-survey verification measurements for the SGLS employed the Amersham KUT (⁴⁰K, ²³⁸U, and ²³²Th) verifier with serial number 082.

Analysis Notes:

Analyst:	Sobczyk	Date:	04/14/03	Reference:	GJO-HGLP 1.6.3, Rev. 0
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SGLS pre-run and post-run verification spectra were collected at the beginning and end of each day. The verification spectra were all within the control limits. The peak counts per second (cps) at the 609-keV, 1461-keV, and 2615-keV photopeaks on the post-run verification spectra as compared to the pre-run verification spectra for each day were between 5 percent lower and 3 percent higher at the end of the day.

Log spectra for the SGLS were processed in batch mode using APTEC SUPERVISOR to identify individual energy peaks and determine count rates. Post-run verification spectra were used to determine the energy and resolution calibration for processing the data using APTEC SUPERVISOR. Concentrations were calculated in EXCEL (source file: G2EMar03.xls). Zero reference was the top of the 6-in. casing. On the basis of Ledgerwood (1993), the casing configuration was assumed to be one string of 8-in. casing to total log depth (329 ft) and one string of 6-in. casing to 282.5 ft. Casing correction factors were calculated assuming a total casing thickness of 0.625 in. from 0 to 282.5 ft, and 0.3125 in. from 282.5 to 329 ft. The casing correction factor was calculated assuming a casing thickness of 0.3125 in. for both the 6-in. and 8-in. casings. This thickness is based upon the field measurements. Where more than one casing exists at a depth, the casing correction is additive (e.g., 0.3125 in. + 0.3125 in. = 0.625 in. would be the combined thickness for the 6-in. and 8-in. casings). A water correction was applied to the data below 322 ft. Dead time corrections are applied when the dead time is greater than 10.5 percent. As dead time did not exceed 10.5 percent, a dead time correction was not applied.

Log Plot Notes:

Separate log plots are provided for gross gamma and dead time, naturally occurring radionuclides (⁴⁰K, ²³⁸U, and ²³²Th), and man-made radionuclides. Plots of the repeat logs versus the original logs are included. For each radionuclide, the energy value of the spectral peak used for quantification is indicated. Unless otherwise noted, all radionuclides are plotted in picocuries per gram (pCi/g). The open circles indicate the minimum detectable level (MDL) for each radionuclide. Error bars on each plot represent error associated with counting statistics only and do not include errors associated with the inverse efficiency function, dead time correction, or casing correction. These errors are discussed in the calibration report. A combination plot is also included to facilitate correlation. The ²¹⁴Bi peak at 1764 keV was used to determine the

naturally occurring ^{238}U concentrations on the combination plot rather than the ^{214}Bi peak at 609 keV because it exhibited slightly higher net counts per second.

Results and Interpretations:

^{137}Cs was the only man-made radionuclide detected in this borehole. ^{137}Cs was detected in the interval from 58 to 159 ft. The range of concentrations was from 0.3 to 200 pCi/g; the maximum concentration was measured at 67 ft. ^{137}Cs was also detected at log depths of 182 and 316 ft at a concentration of 0.3 pCi/g.

Recognizable changes in the KUT logs occurred in this borehole. However, the changes above 282 ft are more indicative of the well completion materials than the surrounding formation. The annulus between the 6-in. and 8-in. casings was perforated between 2 and 277 ft and grouted with cement.

The plots of the repeat logs demonstrate reasonable repeatability of the SGLS data for ^{137}Cs (662 keV) and natural radionuclides (609, 1461, 1764, and 2614 keV).

Gross gamma logs from Additon et al. (1978) (attached) indicate that the sediments surrounding this borehole contained significant amounts of man-made gamma radiation from 1963 through 1976. The logs from 3/27/58 and 5/19/59 appear to detect background levels of gamma radiation. The log from 5/21/63 appears to detect relatively high gamma activity in the interval from 10 ft (3 m) to 330 ft (101 m). The log from 4/28/76 appears to detect relatively high gamma activity in the interval from 56 ft (17 m) to 157 ft (48 m). Comparison of these gross gamma logs indicates that a major contamination event occurred between 1959 and 1963. The SGLS detected ^{137}Cs in the interval from 58 ft through 159 ft.

References:

Additon, M.K., K.R. Fecht, T.L. Jones, and G.V. Last, 1978. *Scintillation Probe Profiles From 200 East Area Crib Monitoring Wells*, RHO-LD-28, Rockwell Hanford Operations, Richland, Washington.

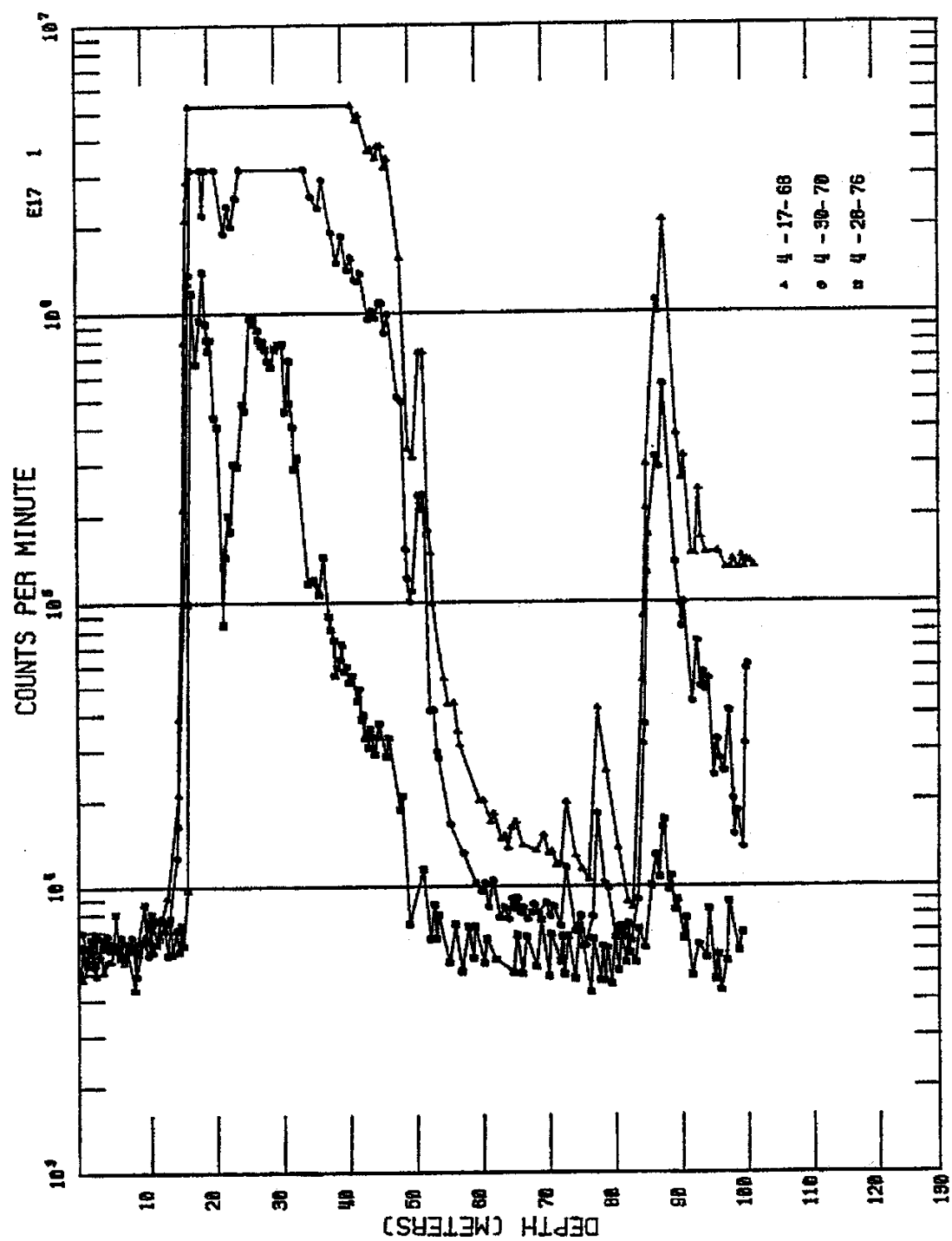
Ledgerwood, R.K., 1993. *Summaries of Well Construction Data and Field Observations for Existing 200-East Resource Protection Wells*, WHC-SD-ER-TI-007, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

¹ GWL – groundwater level

² TOC – top of casing

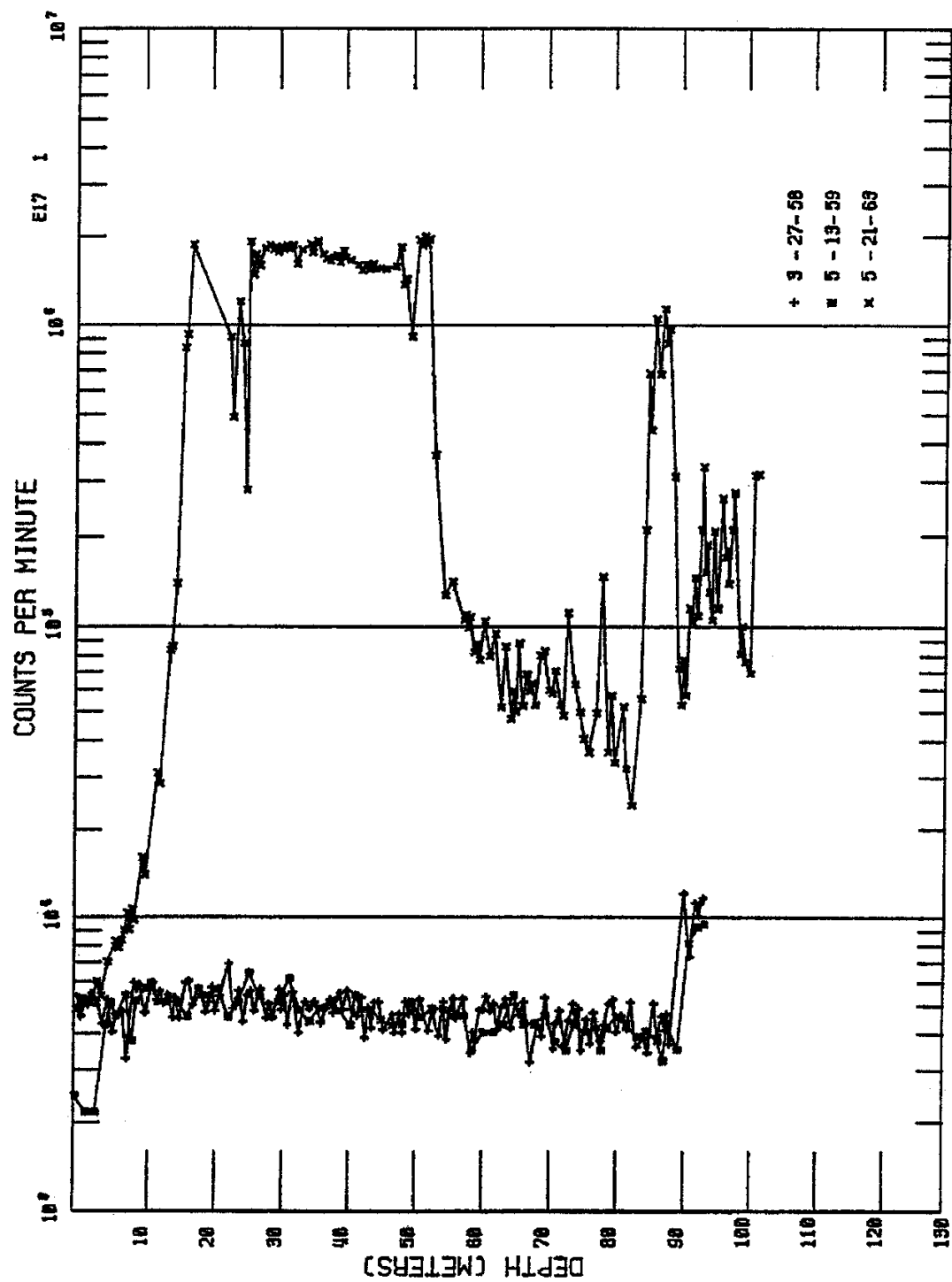
³ HWIS – Hanford Well Information System

⁴ N/A – not applicable



from Additon et al. (1978)

Scintillation Probe Profiles for Borehole 299-E17-1, Logged on 4/17/68, 4/30/70, and 4/28/76

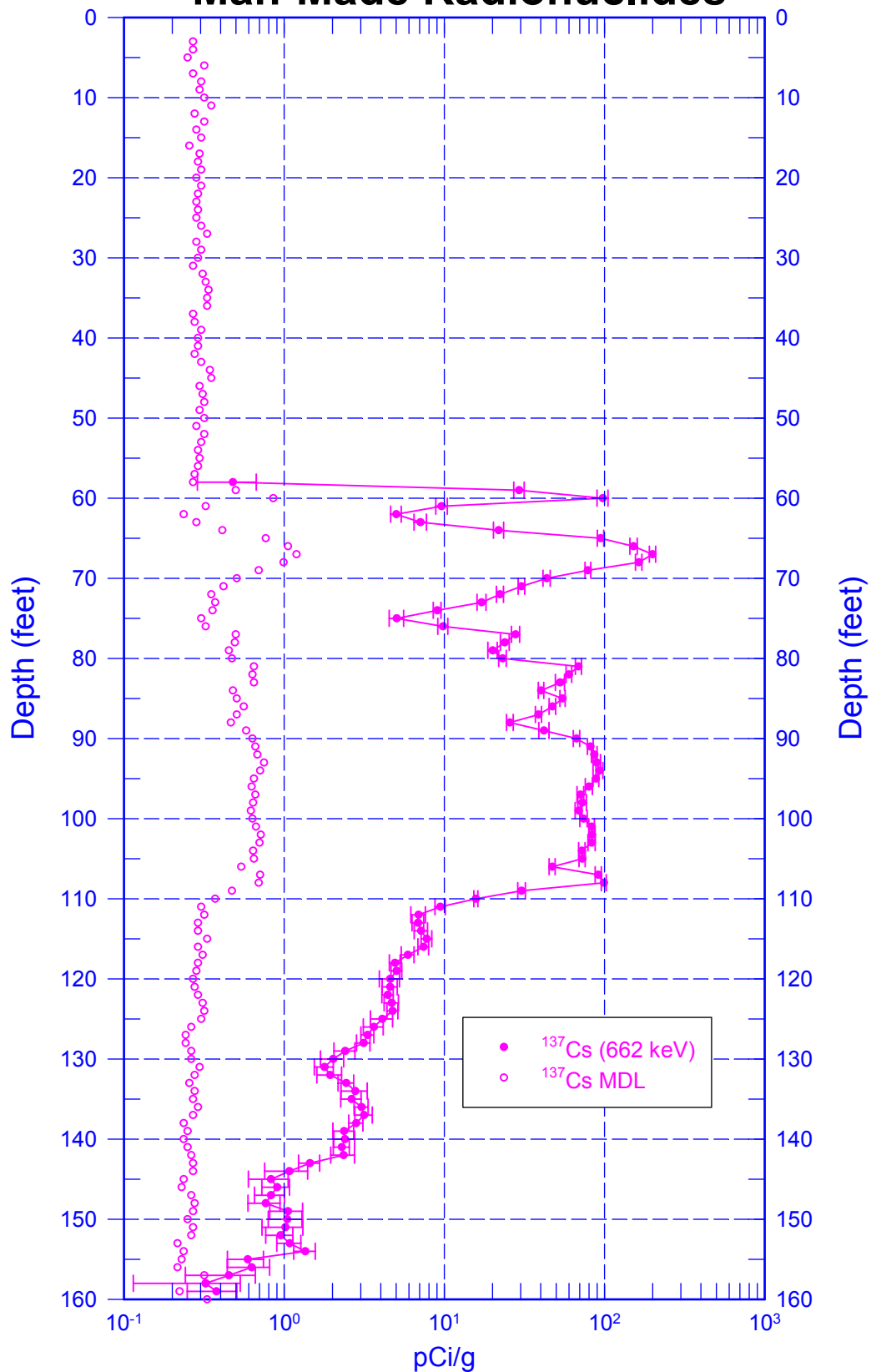


from Additon et al. (1978)

Scintillation Probe Profiles for Borehole 299-E17-1, Logged on 3/27/58, 5/13/59, and 5/21/63

299-E17-01 (A4728)

Man-Made Radionuclides

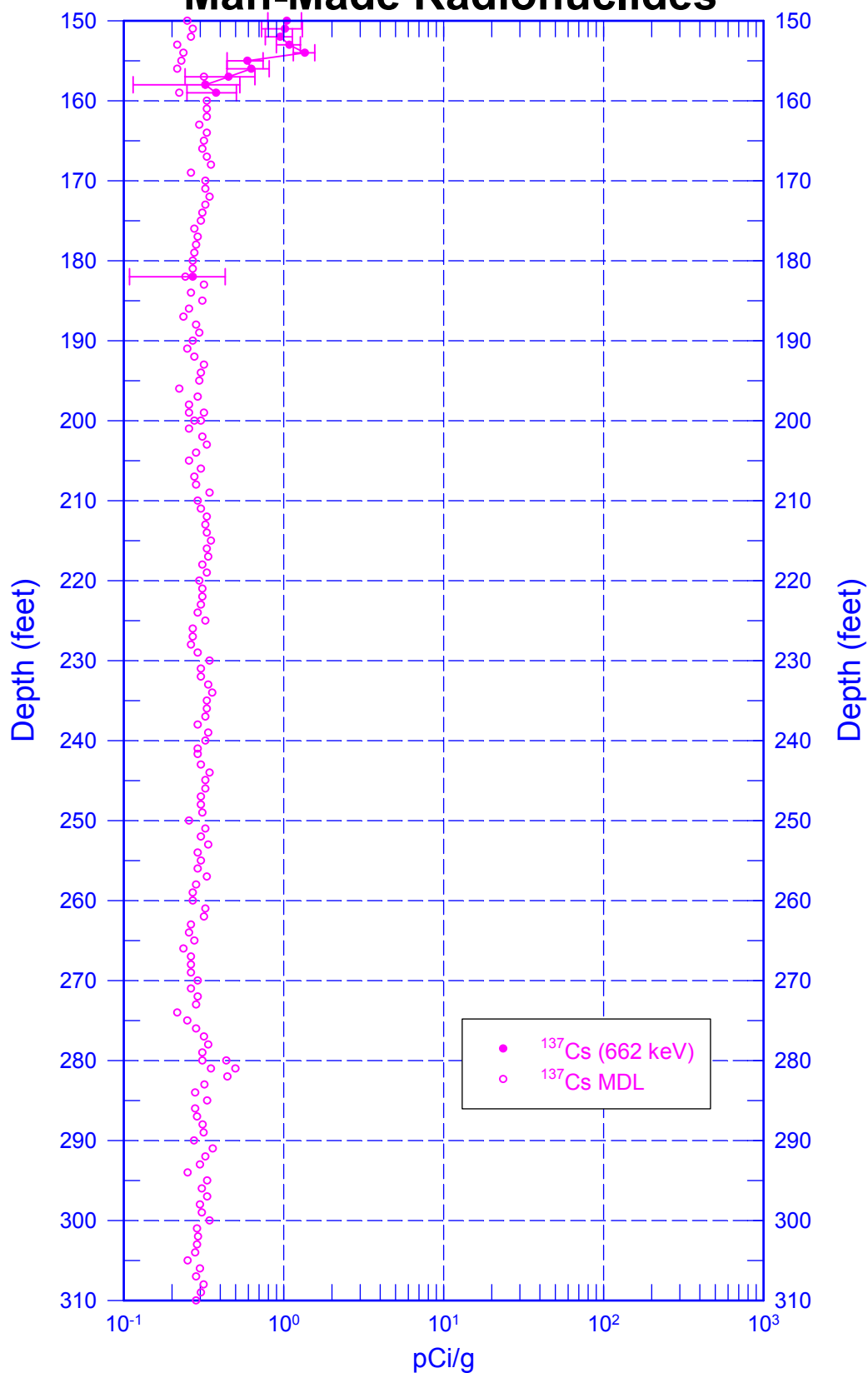


Zero Reference = Top of Casing

Date of Last Logging Run
4/01/2003

299-E17-01 (A4728)

Man-Made Radionuclides

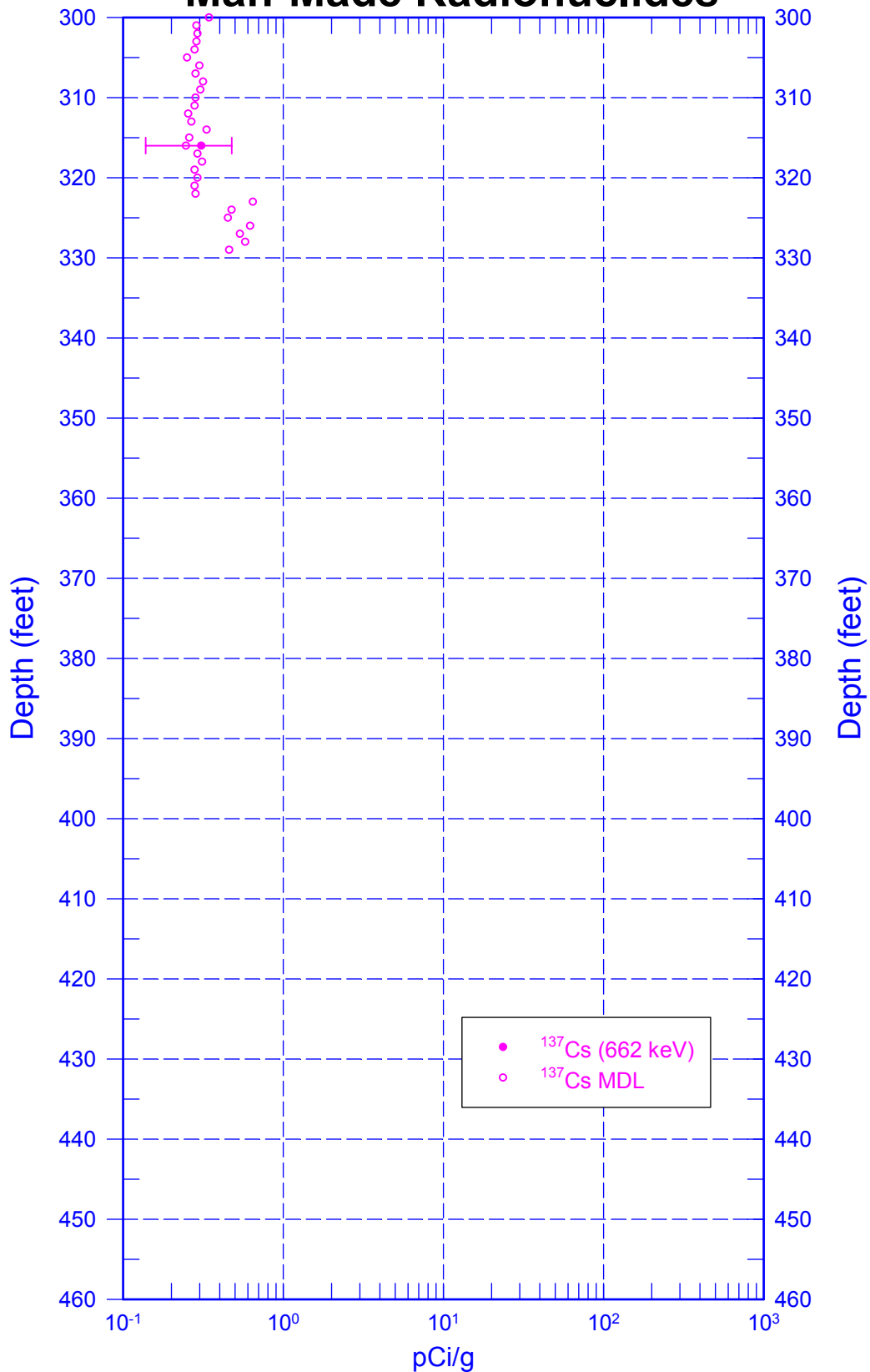


Zero Reference = Top of Casing

Date of Last Logging Run
4/01/2003

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Man-Made Radionuclides

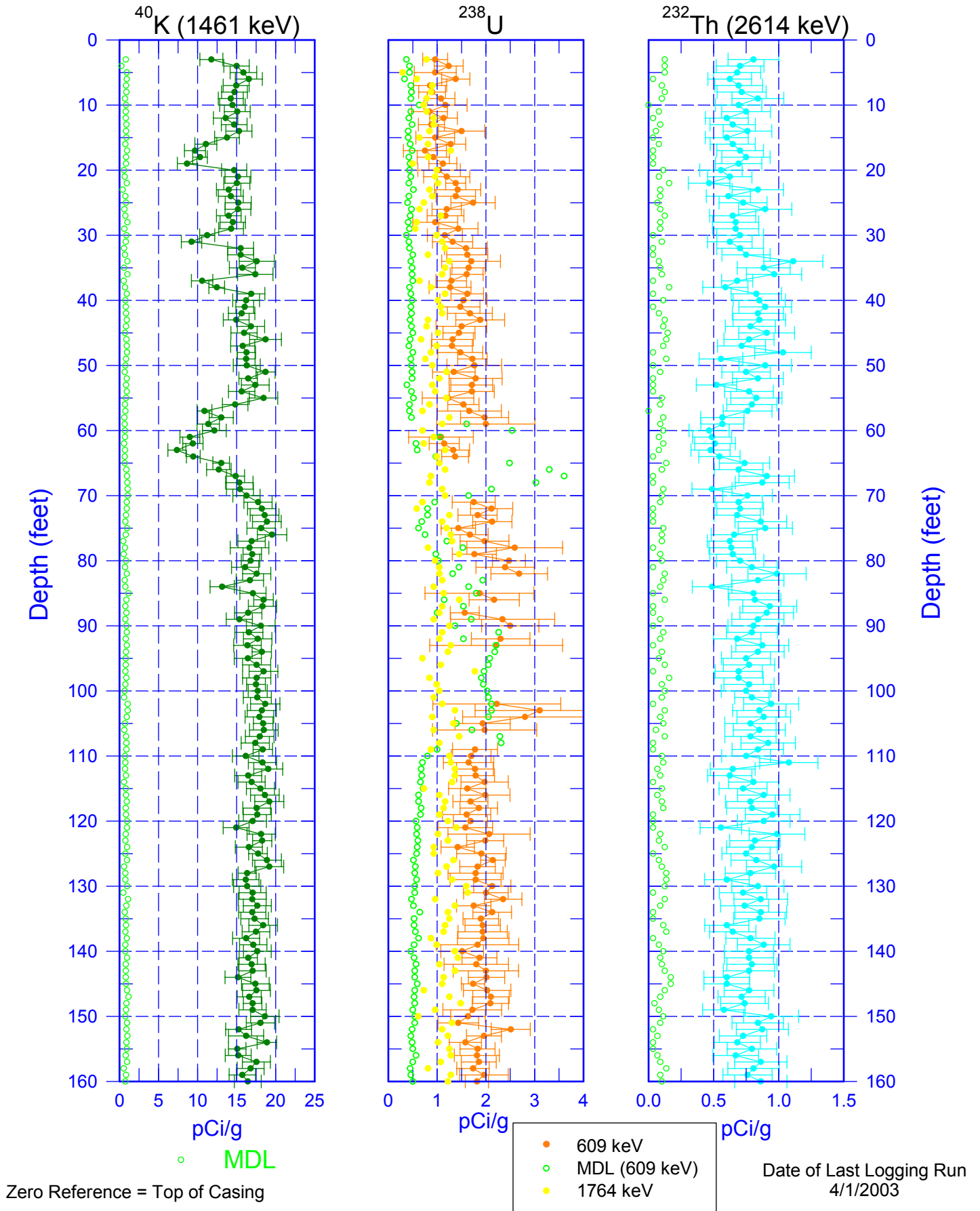


Zero Reference = Top of Casing

Date of Last Logging Run
4/01/2003

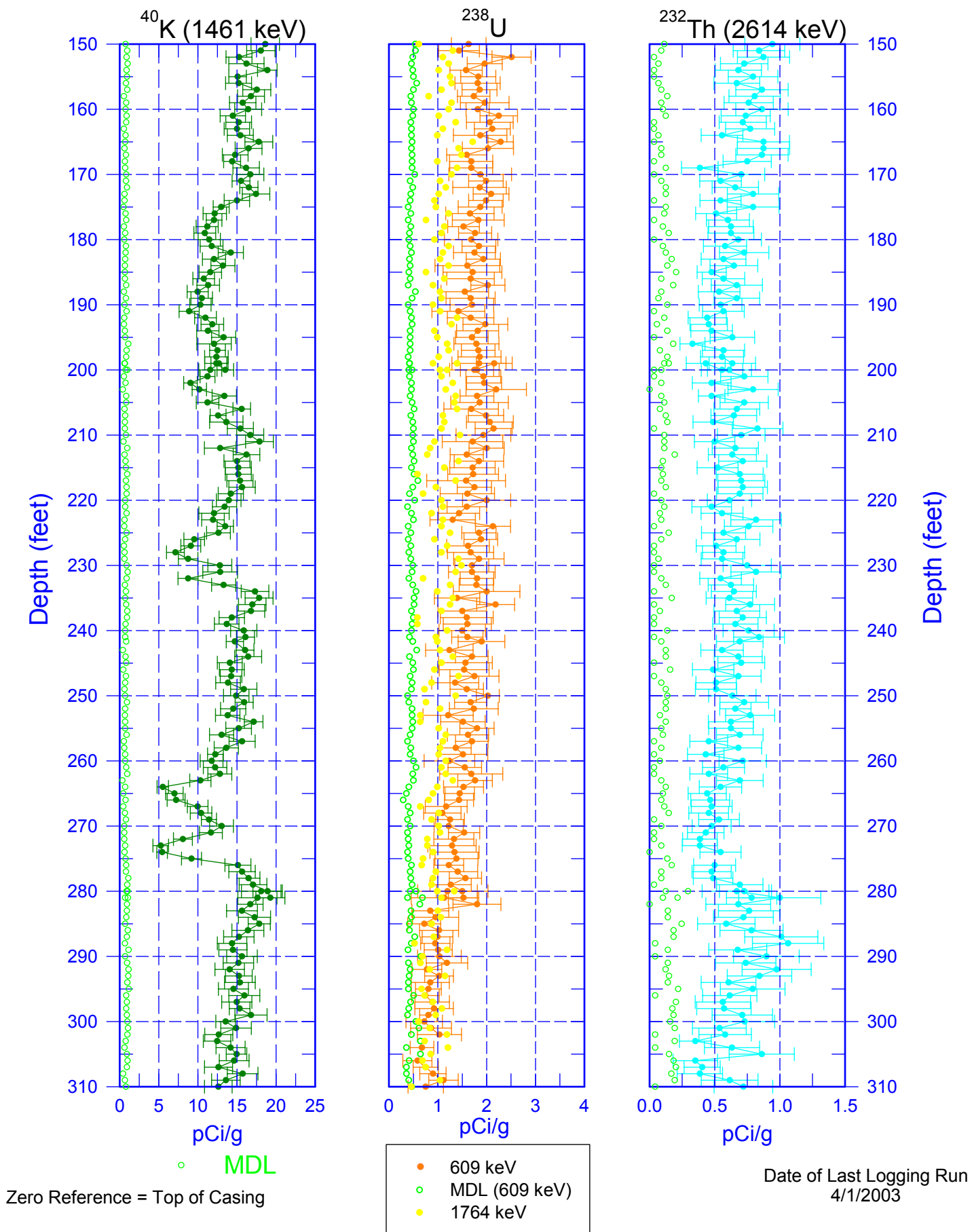
299-E17-01 (A4728)

Natural Gamma Logs



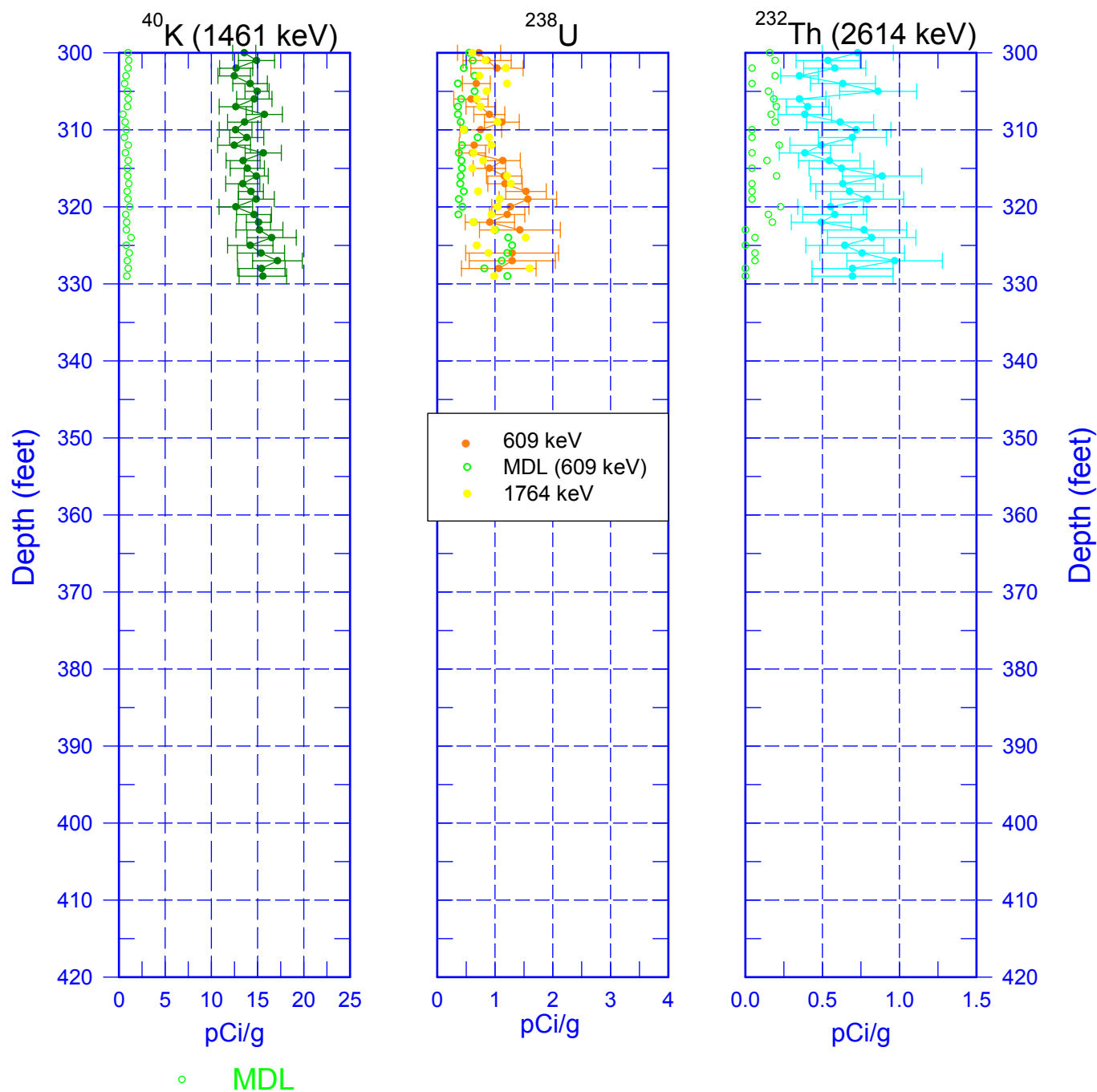
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Natural Gamma Logs



299-E17-01 (A4728)

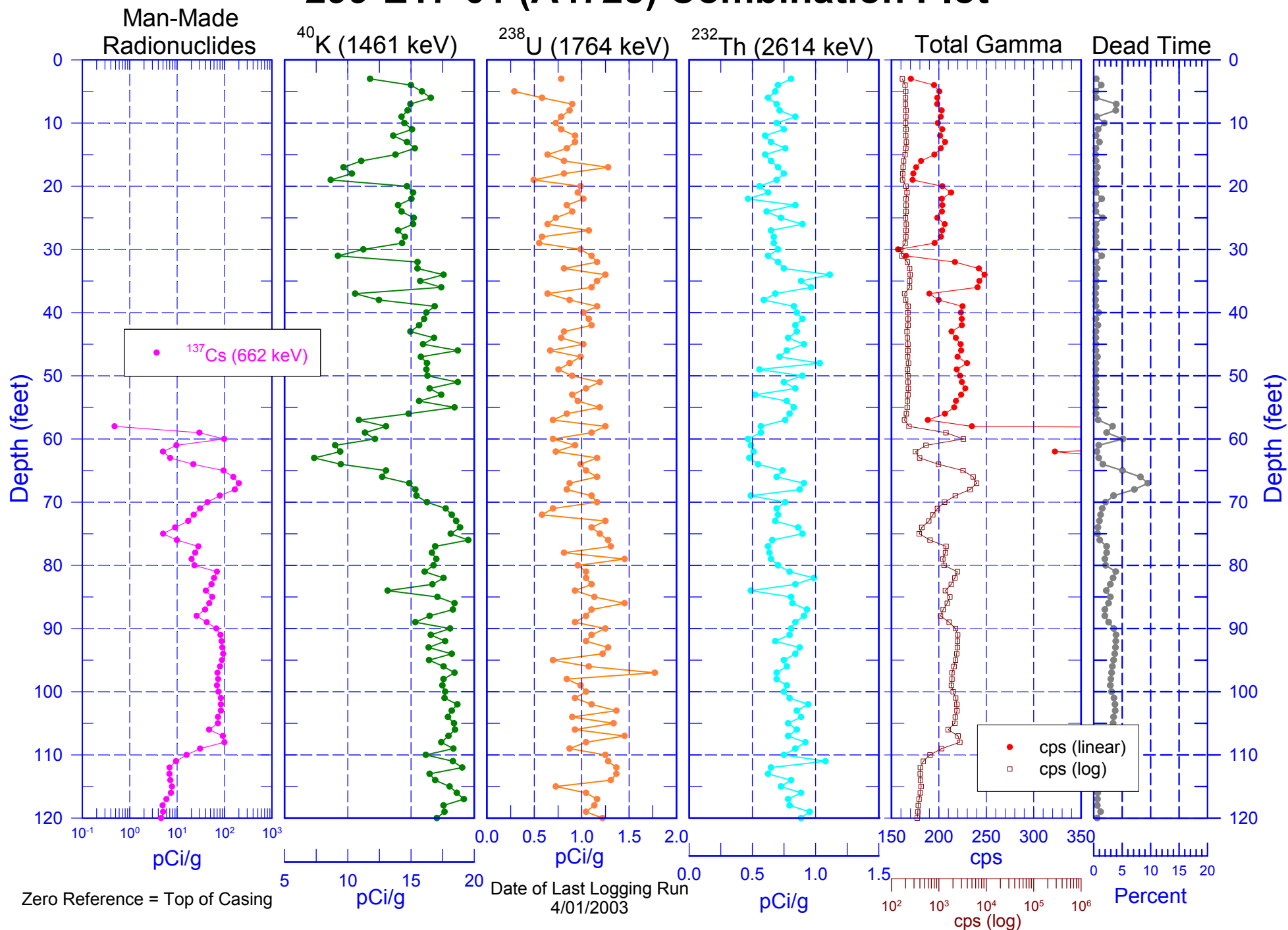
Natural Gamma Logs



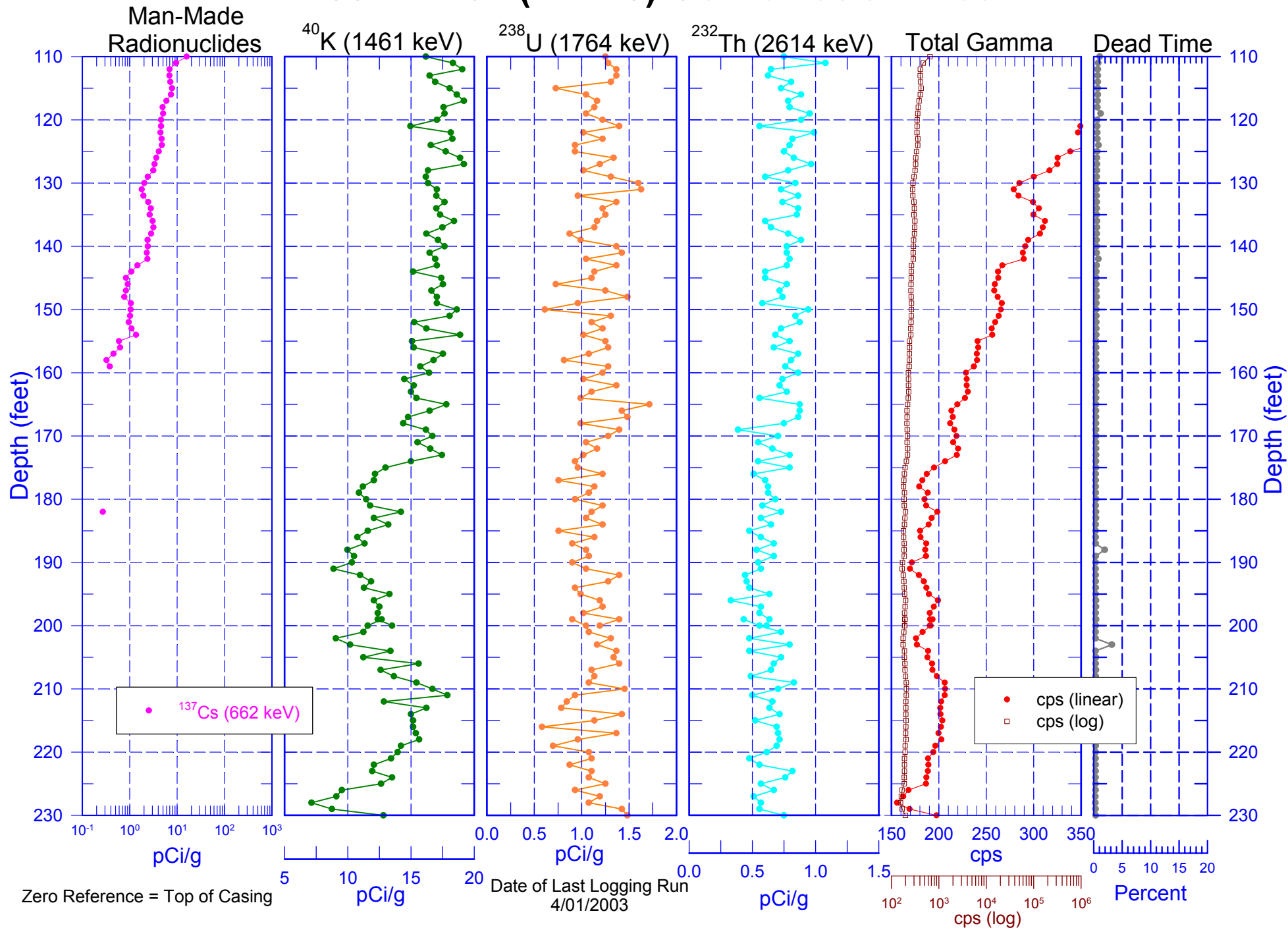
Zero Reference = Top of Casing

Date of Last Logging Run
4/1/2003

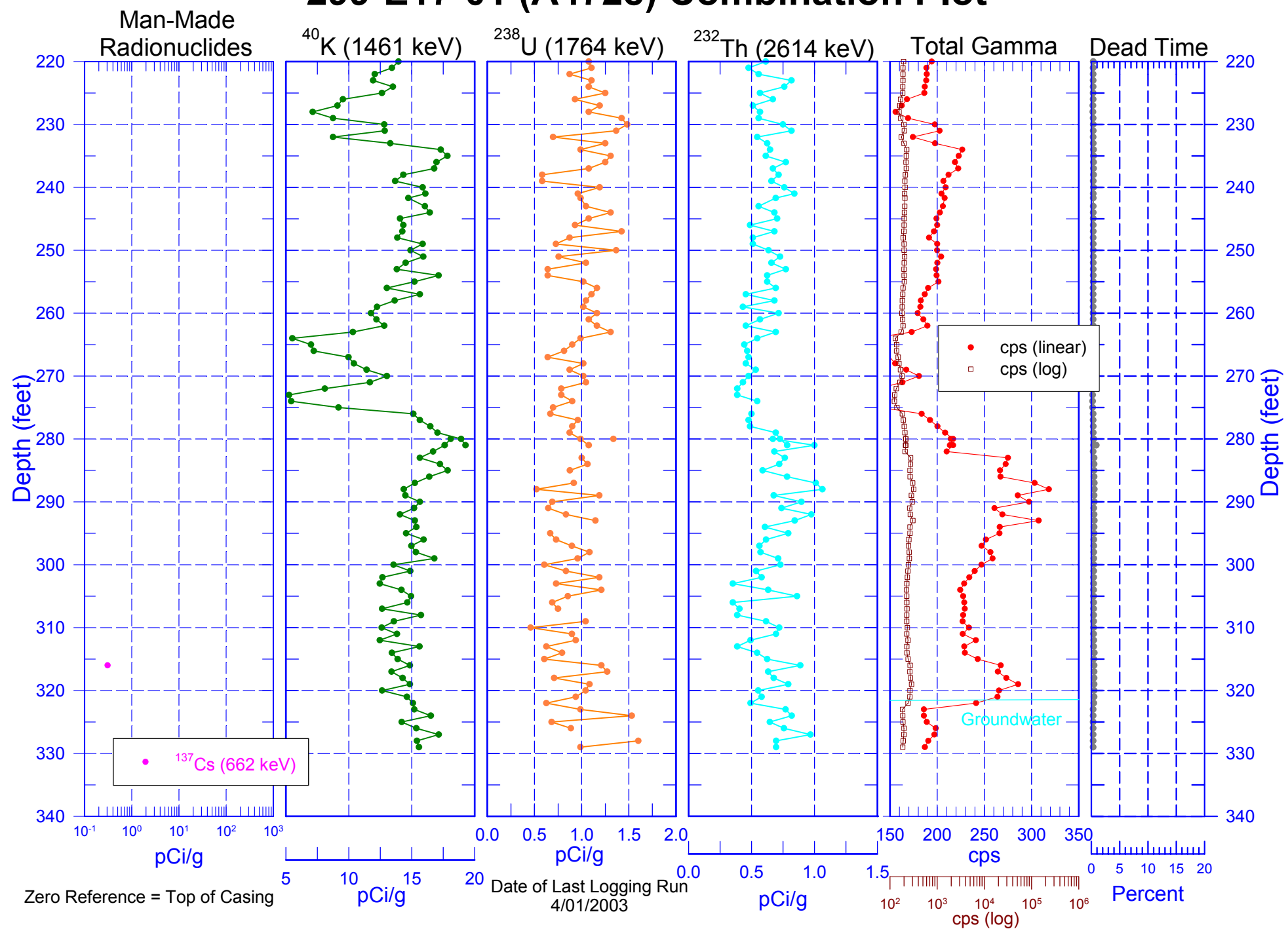
299-E17-01 (A4728) Combination Plot



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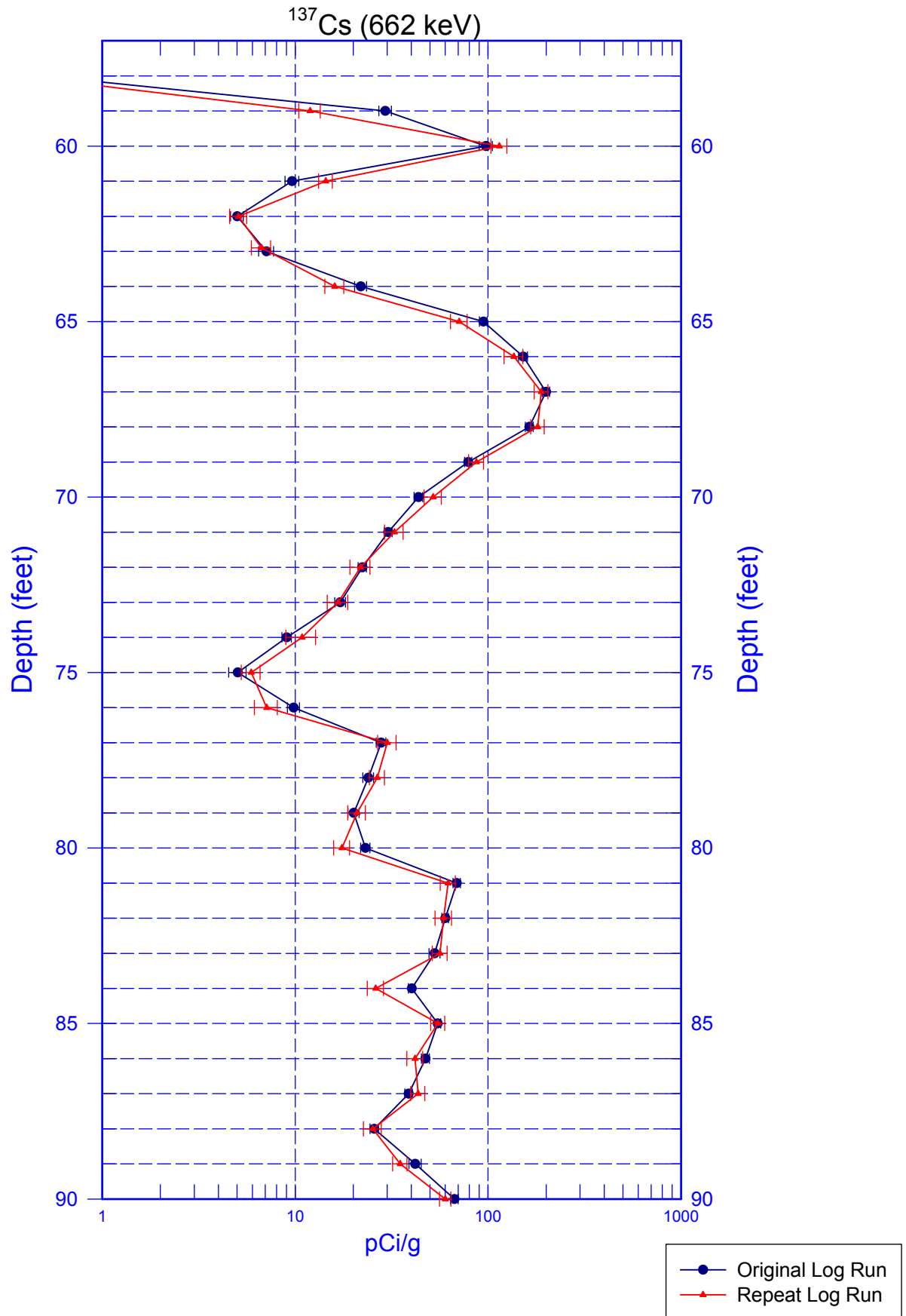


299-E17-01 (A4728) Combination Plot



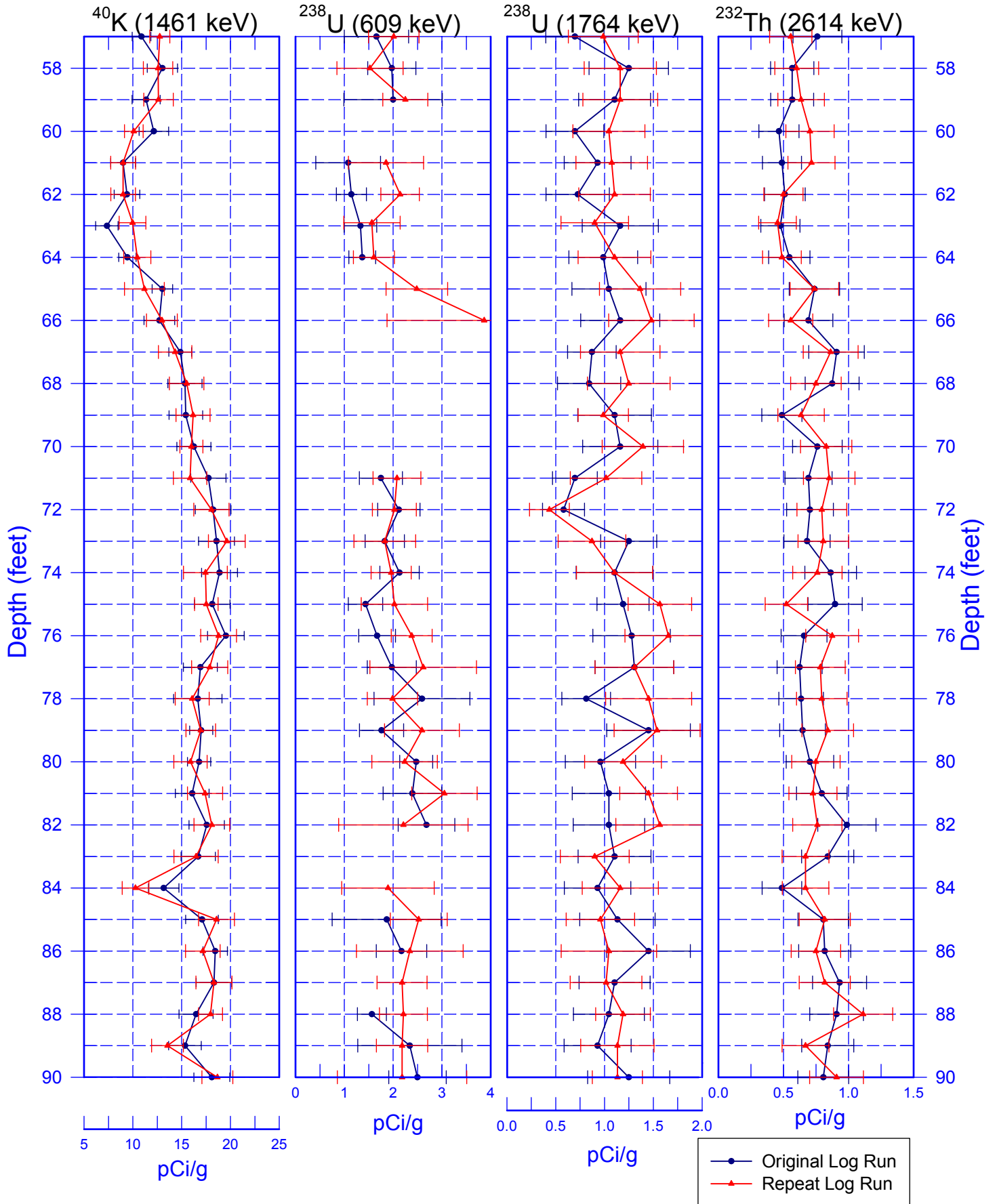
299-E17-01 (A4728)

Rerun of Man-Made Radionuclides (90.0 to 57.0 ft)



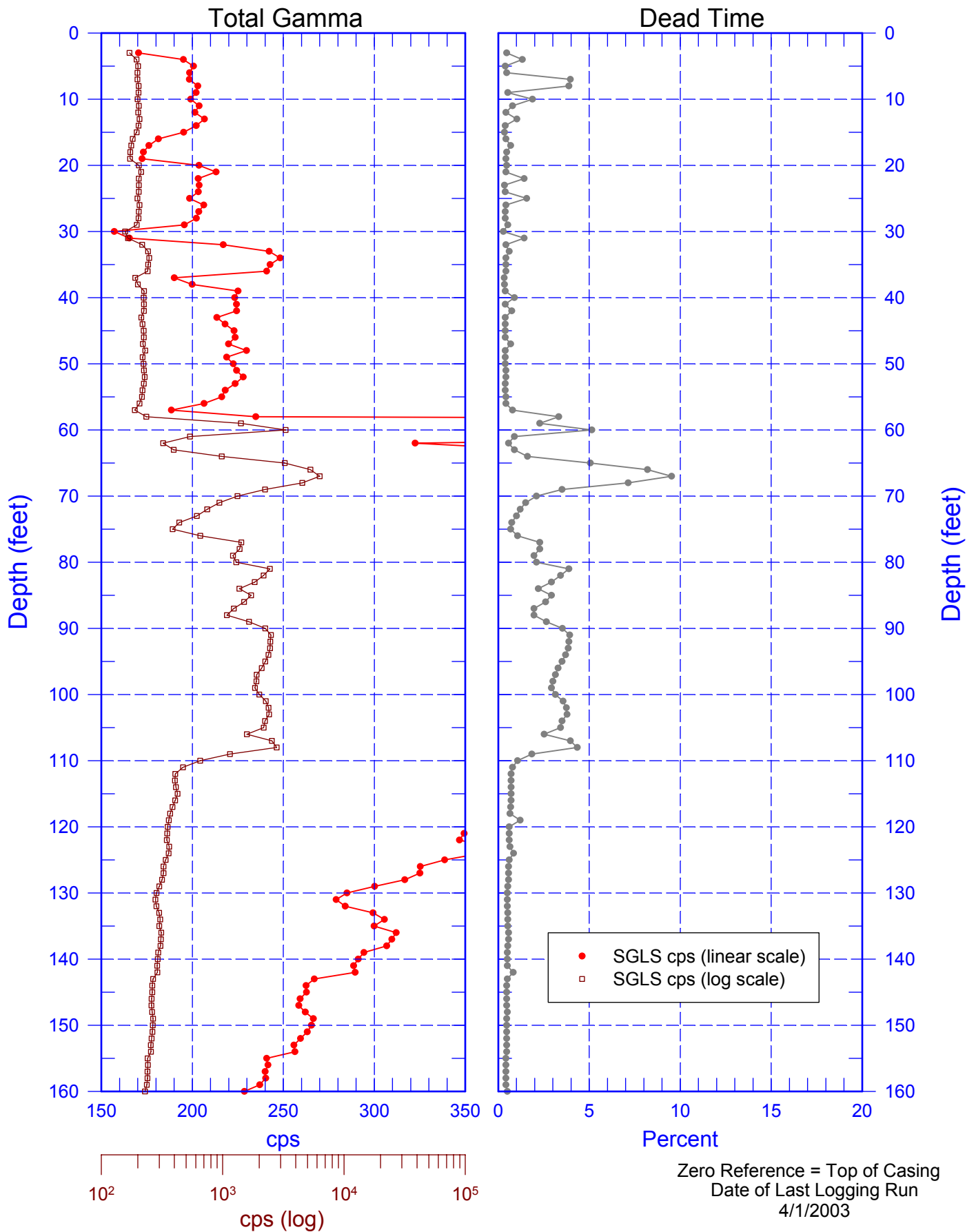
299-E17-01 (A4728)

Rerun of Natural Gamma Logs (90.0 to 57.0 ft)



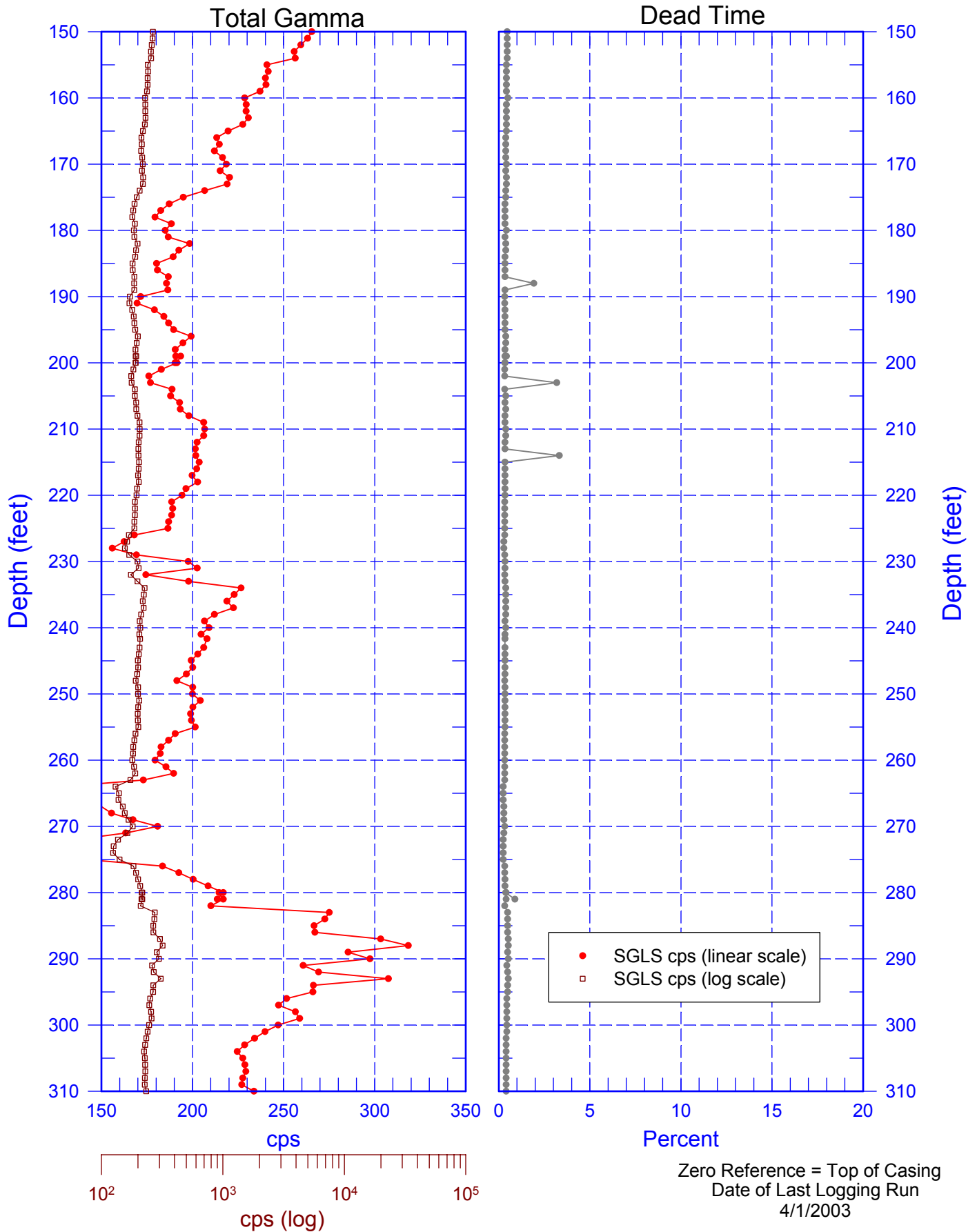
299-E17-01 (A4728)

Total Gamma & Dead Time



299-E17-01 (A4728)

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Total Gamma & Dead Time

